Amendments to the Drawings:

The attached sheet of drawings includes changes to Fig. 2. This sheet replaces the original sheet. In Figure 2, previously omitted reference number 820 has been added.

The attached sheet Replacement Sheet 3A is amended to add previously omitted "ring 422".

The "ring 422" does appear in Fig.'s 3B – 3D because of the slice.

The attached Replacement Sheet showing FIG. 3E adds several reference numerals refereed to in the specification and not previously listed and moves several reference numerals from redundant FIG. 3F. Specifically Reference numeral 464 is added in several locations and Reference numerals 448D & E are moved from deleted FIG. 3F.

Delete FIG. 3F as redundant to FIG. 3E.

The attached Replacement Sheet showing FIG 4A is amended to illustrate the elements referred to in the specification as "holding region 622" and "measurement region 624" respectively.

The attached Replacement Sheet showing FIG 4B is amended to designate the elements referred to in the specification as "two receptacles 690" from the incorrect "692".

Amendment to Figures 5 & 6 is not necessary in view of the amendment to the specification to describe the Reference Numeral 446.

Attachment: Replacement Sheets

Fig. 2; Fig. 3A; 3E; 4A & 4B

Annotated Sheets Showing Changes of the above listed Figures.

REMARKS/ARGUMENTS

The Office Action of 28 December 2005 stated that Claims 1-33 are pending in the application. The Election/Restriction was made FINAL. Claims 32 and 33 are considered withdrawn. The drawings were objected to as failing to comply with 37 CFR § 1.142(b). Specifically, paragraphs [0046]-[0048] refer to an "analyte 80" in Figure 1A and it's not shown in the referenced figure. In paragraph [0054] there is reference to "structure-switching signaling aptamer **820**" but it is not shown in the referenced Figure 2. Paragraphs [0056] and [0057] reference "downstream ring **422**" in Figures 3A-3D but the reference numeral is not found in those figures. Paragraph [0058] references "CEDB electrodes **464**" as disclosed in Figure 3E but it is not found in Figure 3E. Paragraphs [0060] and [0061] reference "holding region **622**" and "measurement region **624**" in Figure 4A but these regions are not found in the referenced drawing. Paragraph [0063] references "two receptacles **690**" in figure 4B but these receptacles are not illustrated in figure 4B.

The drawings were also objected to under 37 CFR 1.84(p)(5)because reference numerals included in the drawings are not mentioned in the description. Specifically, Reference number **126** is displayed in Figures 1A-1C, 5 & 6 but not described in the specification. Reference numbers **448D & 448E** are displayed in Figures 3E & 3F but not described in the specification. Figure 4B displays reference number **692** but this number is not described in the specification. Figures 5 & 6 show reference number **446** but this number is not described in the specification. Corrected drawing sheets were required.

The specification was objected to because of informalities such as the following:

At the end of paragraph [0049] there is a reference to "analyte **800**" but this element was previously referred to as "analyte **80**". In paragraph [0054] there is conflicting references to "Stem-2 **822**" and "Stem-2 **824**". Also, in paragraph [0054], there is confusing

reference to "FDNA **832**" and "FDNA **830**". In paragraph [0058] there are conflicting references to "electrodes **460**" and "electrode **464**". In paragraph [0065] there is conflicting reference to "CDG **250**" and "CDG **200**" and "Charger **250**".

Claims 1, 27 and 28 were objected to because of Claim1, part (b) & Claim 1 part (e). Claims 27 & 28 are objected to because they appear to be duplicates.

Claims 18 & 19 were rejected as indefinite under 35 USC § 112, 2nd Paragraph, because the term "the CDG" lacks antecedent basis.

Claims 1-31 are rejected on the ground of non-statutory obviousness-type double patenting over Claims 1-19, 21-27 & 31 of Applicants' co-pending US Application No. 11/126,515 (ARL 03-106) in view of Arnold *et al.* (US Patent No. 5,532,140 and Lamb *et al.*

Claims 1-15, 18-20, & 22-31 are rejected on the ground of non-statutory obviousness-type double patenting over Claims 1-8, 10, 13 & 15-22 of Applicants' co-pending US Application 10/816,579 (ARL 04-32) in view of Arnold and Lamb cited *supra*.

Applicants respectfully traverse each objection to the specification and drawings and each rejection of the claims.

Election/Restriction: Applicants acknowledge that the election/Restriction requirement has bee made FINAL. Applicants retain the right to present claims 32 & 33 in a divisional application.

Objections to the Drawings: The drawings were objected to as failing to comply with 37 CFR § 1.142(b).

Specifically, paragraphs [0046]-[0048] refer to an "analyte **80**" in Figure 1A and it's not shown in the referenced figure. "Analyte **80**" is shown in Figure 2. The specification has been amended to change the reference to Figures 1 (all referred to) and Figure 2.

In paragraph [0054] there is reference to "structure-switching signaling aptamer **820**" but it is not shown in the referenced Figure 2. Figure 2 has been corrected.

Paragraphs [0056] and [0057] reference "downstream ring **422**" in Figures 3A-3D but the reference numeral is not found in those figures. A label for "ring **422**" has been added to Figure 3A. That element does not appear in Figures 3B-3D because of the slice taken and therefore, no correction is needed to those figures.

Paragraph [0058] references "CEDB electrodes **464**" as disclosed in Figure 3E but it is not found in Figure 3E. The label has been added to the figure and the text has been modified to more clearly state the invention.

Paragraphs [0060] and [0061] reference "holding region **622**" and "measurement region **624**" in Figure 4A but these regions are not found in the referenced drawing. Figure 4A has been amended to show the two regions referred to in the specification.

Paragraph [0063] references "two receptacles **690**" in figure 4B but these receptacles are not illustrated in figure 4B. Figure 4B has been modified to show the two receptacles. They were in correctly referenced as "692".

The drawings were also objected to under 37 CFR 1.84(p)(5)because reference numerals included in the drawings are not mentioned in the description.

Specifically, Reference number **126** is displayed in Figures 1A-1C, 5 & 6 but not described in the specification. This objection is obviated by amending paragraph [0048] by labeling the "induction port" referred to there as "**126**".

Reference numbers **448D & 448E** are displayed in Figures 3E & 3F but not described in the specification. Figure 3F is deleted along with mention of figure 3F in the specification. Figure 3E is corrected to cover the removal of an now unnecessary figure.

Figure 4B displays reference number **692** but this number is not described in the specification. The figure is amended to correct "692" to "690" which is discussed in the specification.

Figures 5 & 6 show reference number **446** but this number is not described in the specification. The description of figure 5 has been amended to add "with a pipe **446**" so the sentence now reads "...impactor **930** which is connected with a pipe **446** to a pump **190**..." Drawings have been corrected as needed.

Objections to the Specification: The specification was objected to because of informalities such as the following:

At the end of paragraph [0049] there is a reference to "analyte **800**" but this element was previously referred to as "analyte **80**". The specification has been corrected to refer to "analyte **80**" in all instances.

In paragraph [0054] there is conflicting references to "Stem-2 **822**" and "Stem-2 **824**". The specification has been amended to refer to "Stem-2 **824**".

Also, in paragraph [0054], there is confusing reference to "FDNA **832**" and "FDNA **830**". The text has been amended to refer to "FDNA **830**".

In paragraph [0058] there are conflicting references to "electrodes **460**" and "electrode **464**". The text has been amended to refer to "electrodes **464**".

In paragraph [0065] there is conflicting reference to "CDG **250**" and "CDG **200**" and "Charger **250**". The text of the specification has been amended to refer to "CDG **200**" in all instances. Appropriate amendment is made to account for all objections to the drawings and specification.

Objections to the Claims: Claims 1, 27 and 28 were objected to because of informalities and clerical errors.

Claim1, part (b) & Claim 1 part (e) have the following informalities: Claim 1, part (b) uses two terms for the same element; and Claim 1, part (e) uses a "," where it should use a ";". Both typographical irregularities have been corrected.

Claims 27 & 28 are objected to because they appear to be duplicates. Claim 28 has been canceled. Appropriate correction has been done.

Claims 18 & 19 were rejected as indefinite under 35 USC § 112, 2nd Paragraph, because the term "the CDG" lacks antecedent basis. An antecedent basis has been added to both claims thereby obviating this rejection. The definition of CDG is found in the specification at paragraph [0048].

Rejections

Claims 1-31 are rejected on the ground of non-statutory obviousness-type double patenting over Claims 1-19, 21-27 & 31 of Applicants' co-pending US Application No. 11/126,515 (ARL 03-106) in view of Arnold *et al.* (US Patent No. 5,532,140 and Lamb *et al.* Applicants respectively traverse the obviousness-type double patenting rejection. The rejection looks only at individual elements and does not treat the invention as a whole.

Applicants have on file several cases dealing with the same area of technology but the invention claimed in each application is different and operates in a different manner. Applicants provide and incorporate herein the attached chart showing the patentably distinct differences in the elements of the different applications by Applicants.

Further, Claims 1-27 and 31 are rejected under the judicially created doctrine of "obviousness-type double patenting" because, they are allegedly un-patentable over co-pending Application 11/126,515. It is alleged that "the only additional limitations of the aerosol particle detector and the DAS output orifice found in enumerated claims of the instant application are anticipated by the co-pending application." The examiner alleges that the only missing limitations of the claims are:

> First, in claim 1, part (c) is anticipated by the "...aerosol particle counter (280), which could be used as the aerosol particle detector."

Second, is "...an additional DAS outlet orifice found in the instant applications claim 1 . . ."

Applicants contend that the key differences between the instant application and the co-pending Application 11/126,515 lies in claims 1 and 31. The instant application 10/708/191, in claim 1 part (c), requires a charger to "impart an electrical charge to any of said particles accepted such that the now charged particles will have a charge opposite that of the CDAL;" In Application 10/708/191, the particle and CDAL must be oppositely charged, because the force that causes these two particles to collide is the electrostatic force. The CDAL is ejected, and the oppositely charged particles are drawn to it by electrostatic forces. There is no suggestion that the CDAL is shot on a trajectory such that it collides with a specific particle that was measured to have some specific optical property.

The 11/126,515 application, as amended, on the other hand, does not mention a charger in claims 1 or 31.

The 11/126,515 application, in the summary, paragraph [0025], states: "Yet another object of the present invention is to provide an APA that does not require charging of the airborne particles."

The 11/125,515 application, in the "Description of Related Art" section, after describing co-pending instant Application 10/708,191 and other approaches to measuring analytes in airborne particles, states in paragraph [0016], "Another potential problem for the methods described above, as far as measurement of biological analytes is concerned, is that the particles are given an electric charge, so that they have a charge that is opposite to that of the droplets and are attracted to the droplets. However, there is a concern that the charging of the particles may modify the biological analytes in these particles so that they can no longer be specifically analyzed."

The specification of the 11/126,515 application, paragraph [0043], states ..."An aerosol-particle detector (APD) 900 in the PDCS 400 detects when a particle having certain optical characteristics passes through a predefined detection region in the APD 900. When the APD 900 detects such a particle, it signals to the CDG 200 to eject a charged-droplet-of-the-analysis-liquid (CDAL) 150 into the flow of gas 120 and particles 124 with a direction and velocity such that it: (a) enters the PDCS 400 on a trajectory such that it is likely to collide with the particle 124 detected by the APD 900, and (b) moves out of the PDCS 400

with a velocity and direction such it that moves into a droplet analysis system (DAS) 600 and is caught and held for analysis."...

The specification of the 11/126,515 application, paragraph [0051], also states: "The approach of hitting the particle as it flies by is similar to that described for sorting airborne particles by hitting them with a puff of air as described by Y.-L. Pan, V. Boutou, J. R. Bottiger, S. S. Zhang, J.-P. Wolf, and R. K. Chang, "A Puff of Air Sorts Bioaerosols for Pathogen Detection," Aerosol Science and Technology, 38, 598-602 (2004), herein incorporated by reference. The difference from that prior work is that instead of hitting selected particles with a puff of air to change the particle's 124 trajectory, the particles 124 are hit with a CDAL 150 and combine with that CDAL 150 so that the analyte 80 in the particles can be measured, and so that the particle 124 collected into the CDAL 150 can be focused, levitated, and deposited into a small region, as desired."

The 11/126,515 application, but not the instant Application 10/708,191, requires in claim 1, part (c), (iii), that the PDCS: "accepts the DAL through the charged droplet output so that the DAL moves through the particle-droplet collection region and collides with the particle that was detected . . ."

The this Application 10/708,191, does not claim, "...so that the DAL moves through the particle-droplet collection region and collides with the particle that was detected,..." because there is no suggestion in the co-pending Application 10/708,191, of deciding to catch a detected particle into a droplet, and then ejecting a droplet on a trajectory such that it collides with the detected particle. In the instant Application 10/708,191, optical scattering or fluorescence properties of a charged particle may be measured as this charged particle moves toward the oppositely charged CDAL, but that measurement is made so that this information may be used at a later time in the analysis of what is in that particle, not so that a decision can be made as to whether to shoot a CDAL at the charged particle.

In summary, in contrast to the instant Application 10/708,191, the 11/126,515 invention does not require charging of the particles, and one of the objectives of the instant invention is to circumvent the requirement to impart a charge to the airborne particles. However, charging of the particles, for some applications can increase the collection efficiency and, in some applications, can be useful.

A source of confusion may be that in the 11/126,515 application, Claim 9 states, "The APA of claim 1 wherein a charger in the PDCS imparts a charge to the particles drawn into the PDCS, where the polarity of the charge is opposite to that of the CDAL," and Claims 10 and 11 mention specific types of chargers. Also, methods for imparting a charge to the particle are described in the specifications, para [0062], although the charger is not shown in a Figure. The purpose of charging the aerosol is stated in the summary, paragraph [0035], "...Another component used in some embodiments of the APA is an aerosol particle charger that imparts a negative charge to each particle entering the PDCS so that the particle is attracted to the positively charged CDAL that is shot at it, so that the collection efficiency, especially for small particles, is increased. This charger can increase the sensitivity of the APA."

A further, major difference between the 11/126,515 invention and the pending Application 10/708,191 is indicated in the summary of the 11/126,515 invention, paragraph [0027], "Yet another object of the present invention is to provide an APA that is capable of collecting and analyzing the airborne particles that have specified optical scattering or emission features, but not collecting or analyzing those particles that lack these features." There is no indication in pending Application 10/708,191 of how to do such selective collection. Again, the 11/126,515 application, but not the pending Application,10/708,191, requires in claim 1, part (c), (iii), that the PDCS: "...accepts the DAL through the charged droplet output so that the DAL moves through the particle-droplet collection region and collides with the particle that was detected . . .".

The inventions of the two applications, the instant invention and Application 11/126,515 are patentably distinct so there is no support for the rejection based on obviousness double-patenting. Applicants respectfully request the rejection be withdrawn.

Claims 1-15, 18-20, & 22-31 are rejected on the ground of non-statutory obviousness-type double patenting over Claims 1-8, 10, 13 & 15-22 of Applicants' co-pending US Application 10/816,579 (ARL 04-32) in view of Arnold and Lamb cited *supra*. Applicants respectively traverse this rejection in view of the attached chart and the detailed discussion in response to the previous rejection. Applicants incorporate the substance of the above detailed reply as the same basis as for the differences between the instant application

and 10/816,579. The inventions of the two applications, the instant invention and Application 10/816,579 are patentably distinct so there is no support for the rejection based on obviousness double-patenting. Applicants respectfully request the rejection be withdrawn

In view of the Examiner's earlier restriction requirement, Applicant reserves the right to file a divisional application. Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

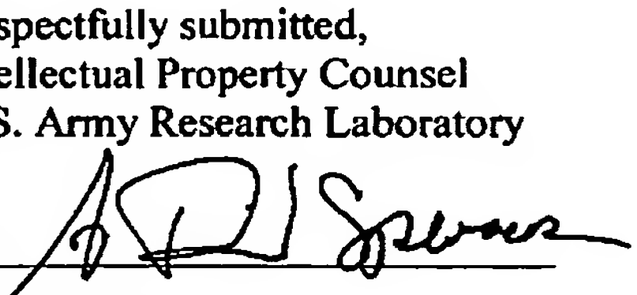
Fees

The Director is hereby authorized to charge any fees which may be required, including additional fees or underpayments under 37 C.F.R. § 1.16 & 1.17; and credit any overpayments to Deposit Account No. **19-2201** held in the name of U.S. Army Materiel Command.

Certificate of Transmission under 37 CFR § 1.8

I hereby certify that the above REQUEST FOR ONE MONTH (1) ENLARGEMENT OF TIME; AMENDMENT WITH ATTACHED COMPARISON CHART, REPLACEMENT DRAWINGS & ANNOTATED DRAWINGS is being facsimile transmitted to Phone No. 571-273-8300 at the United States Patent & Trademark Office on 6 April 2006.

Respectfully submitted,
Intellectual Property Counsel
U.S. Army Research Laboratory

By 

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ARL #	03-106	04-01	04-32	04-54
USPTO #	11/126,515	10/708,191	10/816,579	
Requires particles to be charged?	No. However, charging the particles could increase the collection efficiency of the detected particles.	Yes	Yes	Yes
Collects (a) all particles or (b) "detected" particles?	Collects only "detected" particles, where, e.g., the detector may be one that only "detects" particles having "preselected laser-induced fluorescence properties" (see claim 20 original application), or particles in a certain "preselected size range" (see claim 19 of original application).	Collects all particles, and has no means to select which particles to collect, e.g., based on laser-induced fluorescence.	Collects all particles, and has no means to select which particles to collect, e.g., based on laser-induced fluorescence.	Collects all particles, and has no means to select which particles to collect, e.g., based on laser-induced fluorescence.
Droplet is held on end of capillary when the particles combine with it.	No	No	Yes	Yes
Collects particles for input into whatever follow-on analyzer is used	Yes	Yes	No. Our failure to specify this "collector" aspect in 04-32 was a mistake. I thought it was in the application. This mistake is the reason for 04-54.	Yes

The droplet is:	Shot out of the droplet generator at the correct time so that it will be in a position to collide with and combine with the detected particle when the detected particle reaches the collision region	Either levitated or moving in air; in either case it is in the airstream that carries the oppositely charged particles	On end of capillary when particles collide with it.	On end of capillary when particles collide with it.
Droplet must be charged?	Only for the case where the droplet is levitated electrodynamically during the analysis. Not required in general. However, the droplet can be charged to increase the collection efficiency *of the detected particle.*	Yes. The particles are drawn to the droplet by electrostatic forces.	Yes. The particles are drawn to the droplet by electrostatic forces.	Yes. The particles are drawn to the droplet by electrostatic forces.
Physical mechanism(s) forcing the particle and droplet to collide	Primarily inertial forces. Electrostatic forces can be used to increase the collection efficiency of particles that have been brought close to the droplet by inertial forces (shooting the droplet at the correct time and on the correct trajectory)	Primarily Electrostatic, but with option for inertial forces to also contribute.	Primarily Electrostatic, but with option for inertial forces to also contribute.	Primarily Electrostatic, but with option for inertial forces to also contribute.
Electronics for deciding when to shoot a droplet into	Electronics must be fast, with the total time required to "detect" a	No fast electronics are required to determine	Droplet is not shot into particle stream	Droplet is not shot into particle stream

the particle stream	particle and eject on a trajectory to collide with the detected particle being typically less than 1 millisecond, often less than 0.1 ms, depending upon the velocity of the particles.	when to shoot a droplet. The droplets are ejected either independently of the particle loading, or may vary slowly (e.g., on the order of a minute) if particle numbers are being measured.		
Capillary is needed to hold droplet in the particle stream	No. Capillary is not claimed or mentioned.	No. Capillary is not claimed or mentioned.	Yes	Yes

Appl. No. 10/708, 191
Amdt. Dated 06 April 2006
Reply to Office Action of 28 December 2005
Annotated Sheet Showing Changes

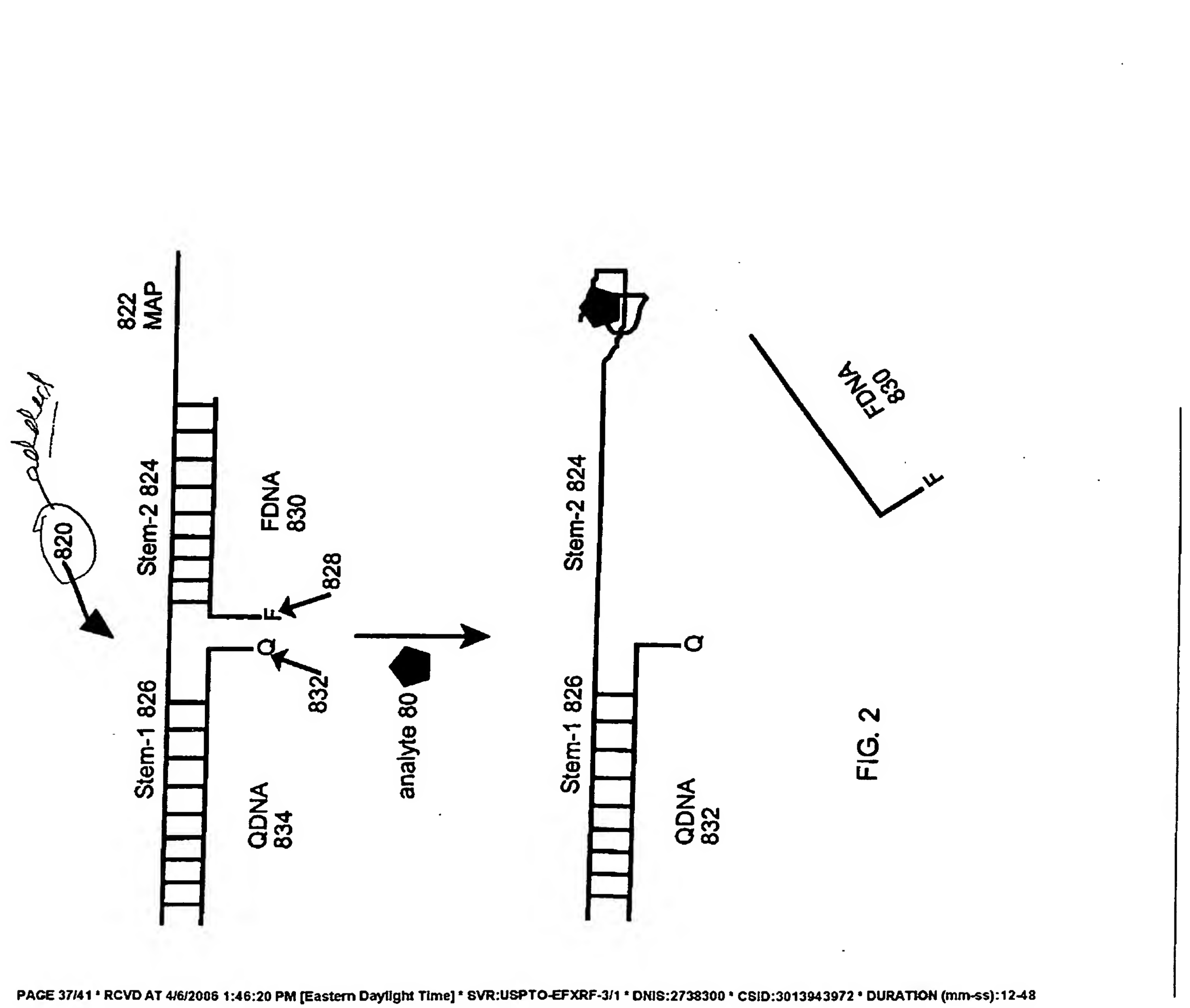

FIG. 2

Appl. No. 10/708, 191
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Annotated Sheet Showing Changes

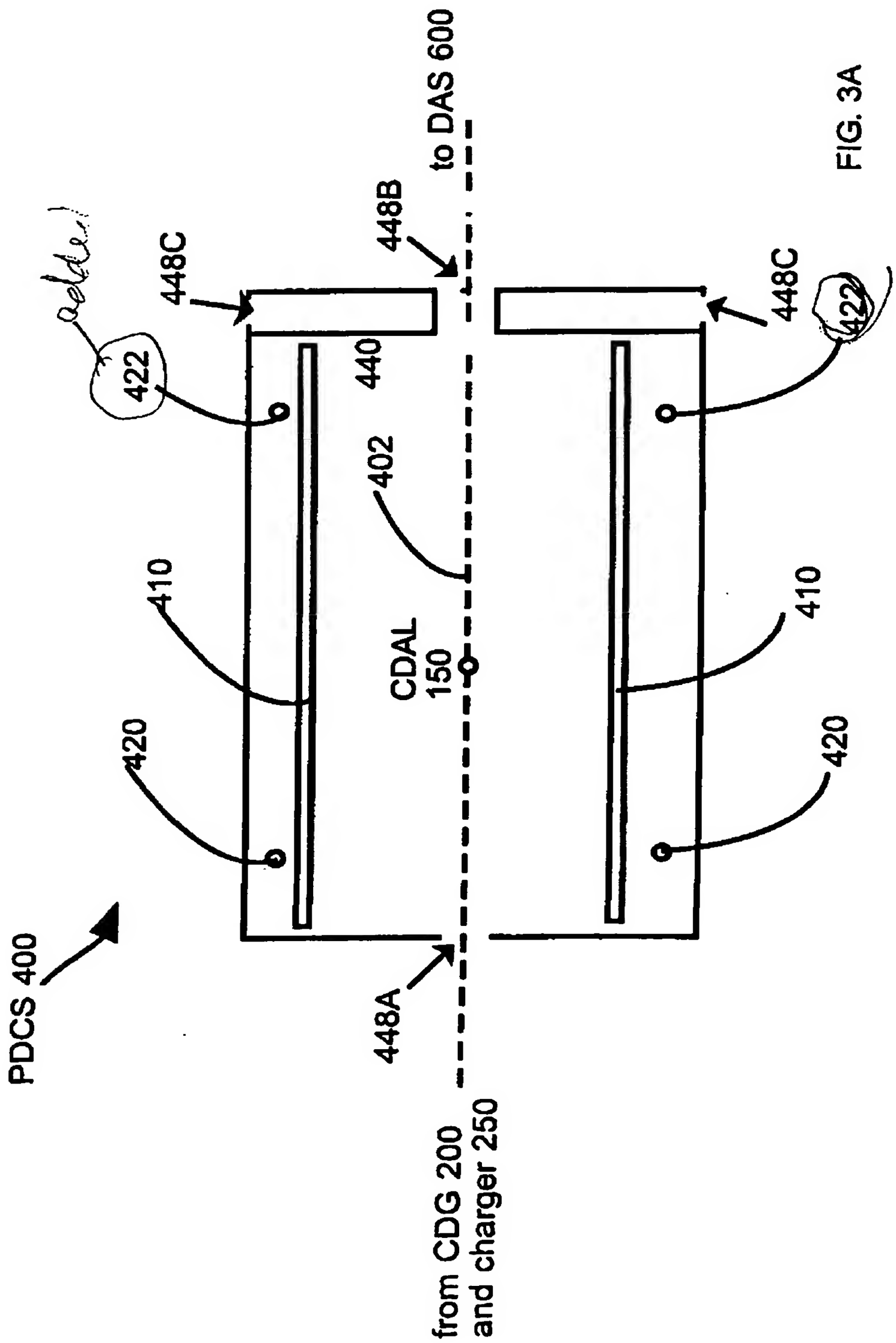

FIG. 3A

Appl. No. 10/708, 191
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Annotated Sheet Showing Changes

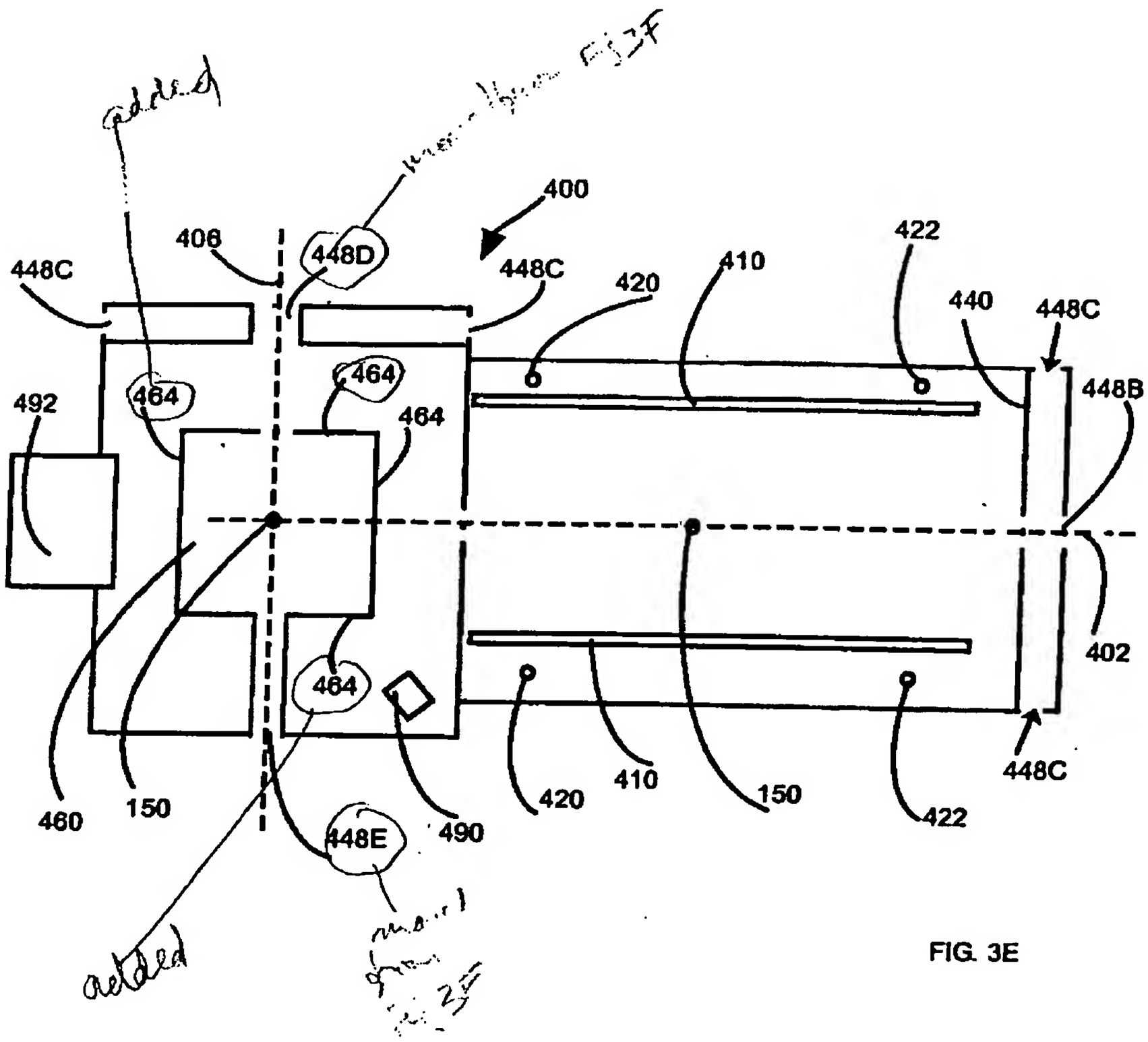

FIG. 3E

Appl. No. 10/708, 191
Amdt. Dated 06 April 2006
Reply to Office Action of 28 December 2005
Annotated Sheet Showing Changes

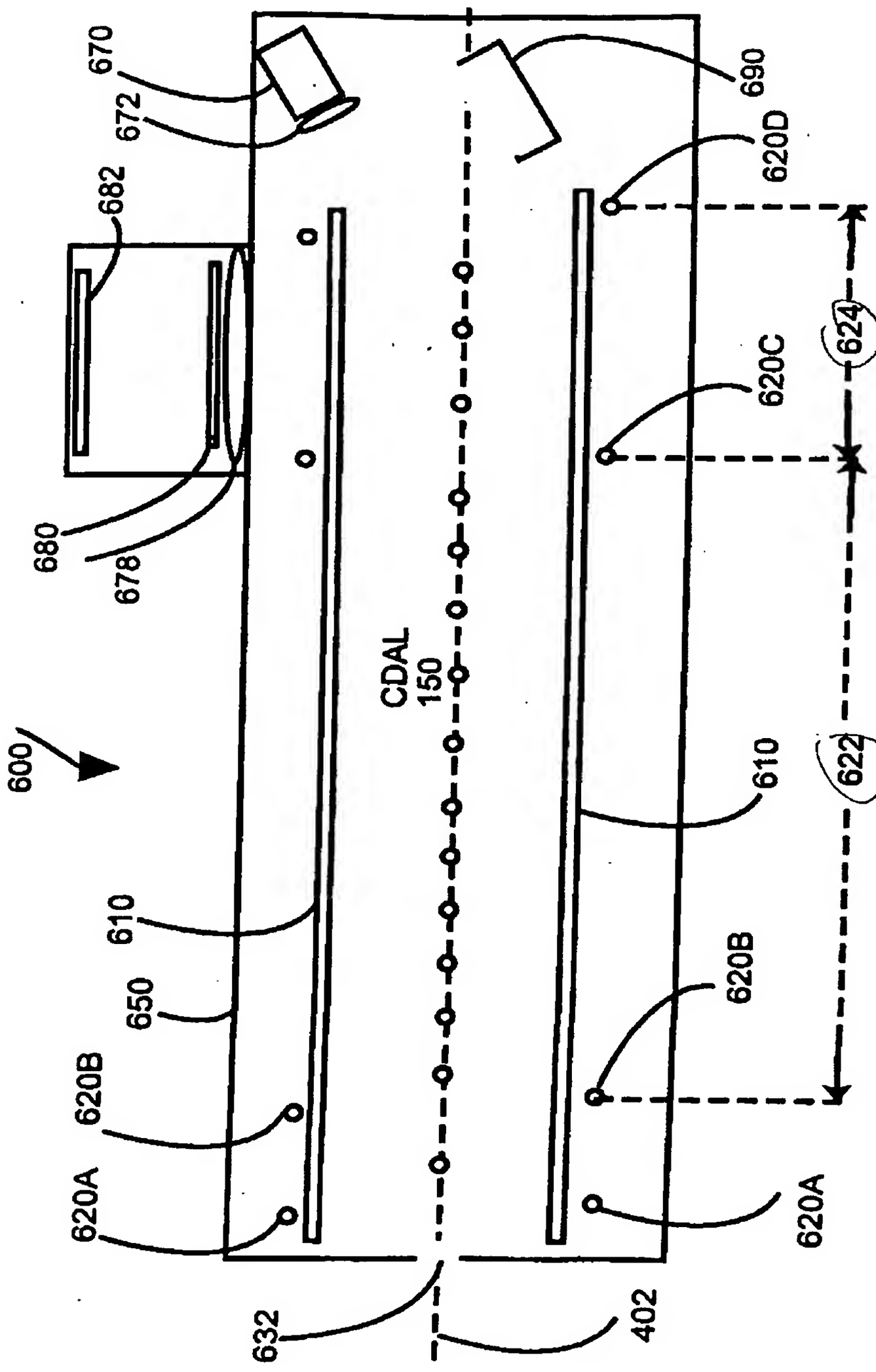

FIG. 4A

Appl. No. 10/708, 191
Amdt. Dated 06 April 2006
Reply to Office Action of 28 December 2005
Annotated Sheet Showing Changes

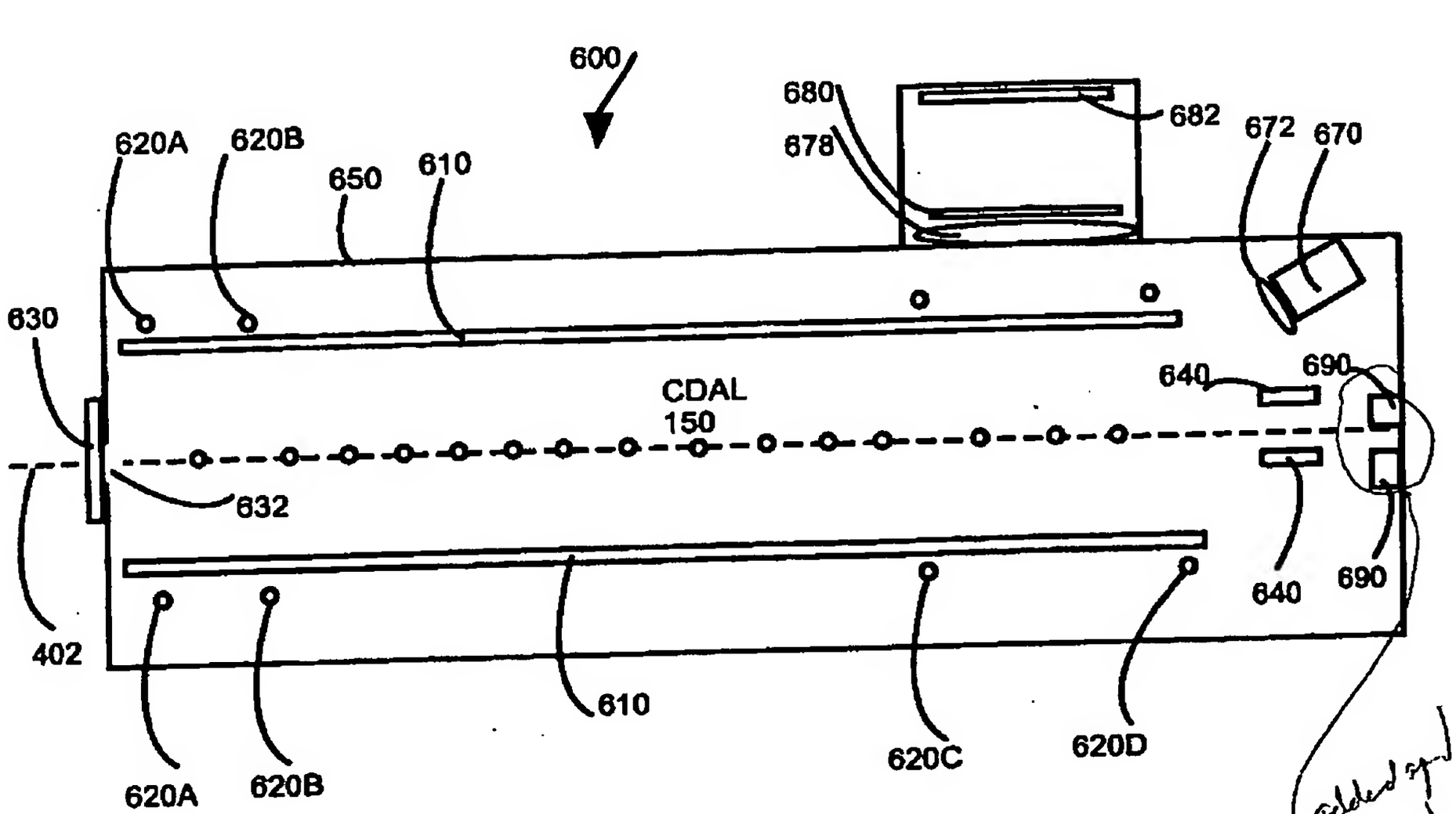

FIG. 4B